Researchers Develop A Sensor To Tell When You're Burning Fat

huffingtonpost.com/entry/researchers-develop-a-sensor-to-tell-when-youre-burning_us_59dda197e4b0b992a8214819

Adi Gaskell , Contributor A London based innovation scout

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As a cyclist, it's reached the time of year where training tends to be all about building your 'base'. The theory goes that you build up some endurance and promote your bodies ability to burn fat for energy rather than glycogen.

Of course, figuring out if you're actually doing that is easier said than done, but a team from ETH Zurich have developed a sensor that analyzes your breath and can tell you if you're in the 'fat burning zone'. The work, which was documented in a recently published paper, provides a real-time monitor for lipolysis by analyzing our exhalations during exercise.

"When burning fat, the body produces by-products that find their way into the blood," the researchers explain. *"This would allow athletes and people who want to lose weight to check for themselves when their bodies begin to burn fat…"*

The fat burning zone

The key substance the team were looking for is called acetone. The sensor they've developed to detect it is believed to be one of the most sensitive ever built. It's capable of detecting a single acetone molecule in 100 million other molecules.

The system was put through its paces with a team of volunteers that were asked to complete a 90 minute session on a bicycle ergometer. Each volunteer was kitted out with a tube into which they were asked to blow, with the sensor monitoring their acetone levels.

“We were able to show how the acetone concentration in the exhalations varies greatly from person to person,” the authors say.

The analysis revealed that there was a high level of variance in each volunteer, with some beginning to burn fat much earlier in the session than others. The analysis also revealed that the breath based method was as effective and accurate as the blood analyses typically used today for monitoring lipolysis.

Smart sensing

The sensor itself uses a porous film made of semiconducting nanoparticles made of tungsten trioxide. Each particle is implanted with silicon atoms. It’s a project that has been several years in development, with the team initially discovering that trioxide nanoparticles were able to interact with acetone if the atoms are arranged in the right way. This in turn reduces the electrical resistance on the chip, thus allowing measurement to take place.

The team originally planned to use the device to diagnose diabetes. It’s well known that those with undiagnosed type 1 diabetes have high concentrations of acetone in their breath. The sensor is so effective however, that it can also be used to detect low levels of acetone as we exhale during exercise.

“This would allow athletes and people who want to lose weight to check for themselves when their bodies begin to burn fat so that they can optimize their training regimen,” the researchers say.

Whilst measuring our fat burning capabilities is possible today, it is typically only possible in a lab environment with incredibly expensive equipment. The team have used these to calibrate their sensor, with positive initial comparisons. They hope that their device will allow for real-time measurements to be taken every day. There is already a prototype of the device, with the next step being to develop this further and hopefully bring it to market.

Den Fettabbau über die Atemluft messen

Forscher haben einen Sensor entwickelt, der anhand der Atemluft einer Person anzeigt, ob ihr Körper Fett verbrennt. Das Ziel ist ein Messgerät für den Alltagsgebrauch – für das Training oder während einer Diät.

10.10.2017, 16:20 Uhr

Joggen, um die körpereigene Fettverbrennung in Gang zu setzen. (Bild: Pixabay)

(sda) Wann der Körper damit beginnt, Fett zu verbrennen, lässt sich heute unter anderem mit einer Blutanalyse bestimmen. Wissenschafter der ETH Zürich und des Universitätsspitals Zürich stellen nun in den «ETH-News» eine Methode vor, mit der sich der Fettabbau «ganz einfach und in Echtzeit in der Atemluft» nachweisen lässt.

Beim Fettabbau im Körper entstünden Nebenprodukte, die ins Blut gelangten, wird Andreas Güntner, Postdoc in der Gruppe von ETH-Professor Sotiris Pratsinis, im Artikel zitiert. Gerade die leichtflüchtigen Moleküle unter ihnen könnten in den Lungenbläschen in die Atemluft übertreten.

Güntner und seine Kollegen haben einen kleinen Gassensor entwickelt, welcher Azeton, das flüchtigste Molekül der Fettabbauprodukte, misst. Der Chip, der derzeit noch die Grösse eines Fünfrappenstücks aufweist, ist mit einem porösen Film aus halbleitenden Nanopartikeln beschichtet.

Nachweis im Fitnessraum

Vor sieben Jahren war vorgesehen, diesen Chip zur Diagnose von Diabetes einzusetzen. Mittlerweile konnten die Wissenschafter nachweisen, dass das Messgerät derart empfindlich ist, dass es auch die sehr geringen Azeton-Konzentrationen im Atem von Sporttreibenden aufspürt. Laut «ETH-News» kann der Chip einzelne Azeton-Moleküle in hundert Millionen anderen Molekülen nachweisen.

Die Forscher schickten nun Probanden auf den Fahrradergometer: Diese pedalierten während eineinhalb Stunden und bliesen regelmässig in ein Röhrchen. «Wir konnten zeigen, dass sich der Azeton-Ausstoss in der Atemluft von Mensch zu Mensch stark unterscheidet», sagt Güntner.

Die frühere, mittlerweile überholte Lehrmeinung besagte, dass Sporttreibende erst nach einer bestimmten Trainingszeit und Herzfrequenz damit beginnen, Fett zu verbrennen. Bei den Zürcher Messungen setzte die Fettverbrennung bei einigen Probanden erst nach anderthalb Stunden, bei anderen schon viel früher ein.

Verfeinern und weiterentwickeln

Die Wissenschafter wollen nun ihre Messtechnik weiter verfeinern: Mit einem deutlich kleineren Chip könnte ein handliches Gerät für den Alltagsgebrauch entstehen. «Damit können Sportler und Abnehmwillige individuell überprüfen, wann ihre Körper beginnen,

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Fett zu verbrennen, um so ihr Training zu optimieren», sagt Güntner.

Getüftelt wird an ETH und Universitätsspital aber auch an weiteren Gassensoren, die andere Moleküle in der Atemluft registrieren. Interessant wären etwa Sensoren für Ammoniak, mit denen sich die Nierenfunktion überprüfen liessen, oder für Isopren, um den Cholesterinstoffwechsel zu untersuchen.

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Fit zu sein, ohne dafür schwitzen zu müssen: Davon träumen viele. Bei Mäusen lässt sich dieses Ziel mit relativ einfachen Mitteln erreichen.

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Sibylle Wehner-von Segesser

Newsletter NZZ am Abend

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phys.org | 10/10/2017 | Staff

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Blow into the tube, please. In the future, the procedure will not just be used by police checking for alcohol intoxication, but also for testing the condition of athletes and for people who want to lose that extra bit of weight. A sensor developed by ETH researchers makes it possible to measure when the body starts burning fat with a convenient breathalyser.

Experts advise anyone looking to shed extra kilos to eat less and exercise more. One way is with endurance training, during which the body burns not only carbohydrates such as sugar, but also fat. When exactly the body begins burning fat can now be determined by analysing, for example, biomarkers in the blood or urine. Scientists at ETH Zurich and the University Hospital Zurich have now developed a method for the highly convenient, real-time monitoring of lipolysis by testing a person's exhalations during exercise.

Body - By-products - Way - Blood - Andreas

"When burning fat, the body produces by-products that find their way into the blood," explains Andreas Güntner, a postdoc in the group of ETH Professor Sotiris Pratsinis. In the pulmonary alveoli, these molecules - especially the volatile ones - enter the air exhaled by the person. The most volatile of these lipid metabolites is acetone. Güntner and his colleagues have developed a small gas sensor that measures the presence of this substance. The sensor is much more sensitive than previous sensors: it can detect a single acetone molecule in hundred million molecules. It also measures acetone exclusively, so the more than 800 other known volatile components in exhalations do not affect the measurement.

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New breath test being developed to help weight-watchers shed kilos

October 13, 2017

SINGAPORE, Oct 13: If you're looking to lose weight, knowing when your body starts to burn fat during exercise – a process known as lipolysis – is important.

Instead of analysing blood or urine samples for biomarkers, lipolysis can now be measured by simply blowing into a tube, according to a report in Science Daily.

Scientists at ETH Zurich and the University Hospital Zurich have developed a small gas sensor that tests for the presence of acetone in a person's exhalations during exercise. This allows for the real-time monitoring of lipolysis. Acetone is one of the body's by-products that finds its way into the person's breath when fat is burned.

Dr Andreas Guntner told Science Daily that the sensor can detect a single acetone molecule in hundred million molecules. It also measures acetone exclusively, so the other known volatile components, which amount to more than 800 in a person's breath, do not affect the measurement.

Together with pulmonary specialists at the University Hospital Zurich, Dr Guntner and his colleagues tested the sensor on volunteers after they had each completed a one-and-a-half-hour session on a bicycle ergometer with two short breaks. "We were able to show how the acetone concentration in the exhalations varies greatly from person to person," said Dr Guntner.

According to the Science Daily report, the sensor has a chip coated with a porous film of tungsten trioxide nanoparticles.

The chip was developed seven years ago when Professor Sotiris Pratsinis and his colleagues from ETH Zurich discovered that tungsten trioxide nanoparticles interacted with acetone if the nanoparticles' atoms were arranged in a certain crystalline structure. This interaction reduces the electrical resistance of the chip which can be measured.

The report mentioned that the chip was originally meant to diagnose diabetes because the breath of patients with untreated Type 1 diabetes contains high concentrations of acetone. But since the sensor was found sensitive enough to detect the low acetone concentrations in a person's exhalations during exercise, the researchers changed tack.

Although the chip is already the size of a one-cent Euro coin in the study, according to Science Daily, the researchers are working on making it even smaller.

"This would allow athletes and people who want to lose weight to check for themselves when their bodies begin to burn fat so that they can optimise their training regimen," says Dr Guntner. –CNA

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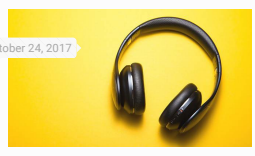
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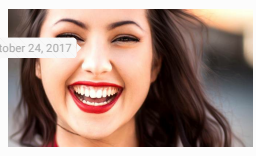
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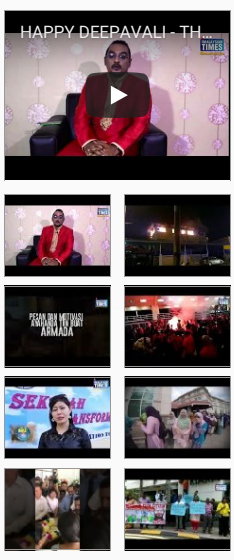

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Breath Instead of a Blood Test

ZURICH (Dispatches)-In the future, a new sensor is going to make it possible to measure the fat the body burns with a convenient breathalyzer in order to test the condition of athletes and people who want to lose weight.

Scientists at ETH Zurich and the University Hospital Zurich have now developed a method for the highly convenient, real-time monitoring of lipolysis by testing a person's exhalations during exercise.

"When burning fat, the body produces by-products that find their way into the blood," explains Andreas Güntner, a postdoc in the group of ETH Professor Sotiris Pratsinis. In the pulmonary alveoli, these molecules -- especially the volatile ones -- enter the air exhaled by the person. The most volatile of these lipid metabolites is acetone. Güntner and his colleagues have developed a small gas sensor that measures the presence of this substance. The sensor is much more sensitive than previous sensors: it can detect a single acetone molecule in hundred million molecules. It also measures acetone exclusively, so the more than 800 other known volatile components in exhalations do not affect the measurement.

In collaboration with pulmonary specialists at the University Hospital Zurich led by Malcolm Kohler, Professor and Director of the Department of Pulmonology, the researchers tested the functioning of the sensor in volunteers while they exercised. The test subjects completed a one-and-a-half-hour session on a bicycle ergometer with two short breaks. Researchers asked the test subjects to blow into a tube that was connected to the acetone sensor at regular intervals.

"We were able to show how the acetone concentration in the exhalations varies greatly from person to person," says Güntner. Scientific opinion used to hold that athletes only begin burning fat after a certain period of physical exertion and on reaching a certain heart rate, but this view is now outdated. The measurements taken by the researchers in Zurich showed that lipolysis in some test subjects did, in fact, only start towards the end of the one-and-a-half-hour training session. In the other volunteers, the measurements showed that their bodies began burning fat much sooner.

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Breath instead of a blood test

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Experts advise anyone looking to shed extra kilos to eat less and exercise more. One way is with endurance training, during which the body burns not only carbohydrates such as sugar, but also fat. When exactly the body begins burning fat can now be determined by analysing, for example, biomarkers in the blood or urine. Scientists at ETH Zurich and the University Hospital Zurich have now developed a method for the highly convenient, real-time monitoring of lipolysis by testing a person's exhalations during exercise.

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Control measurements showed that the new measurement method correlated well with the concentration of the biomarker beta-hydroxybutyrate in the blood of the test subjects. This blood analysis is one of today's standard methods for monitoring lipolysis.

Interaction with nanoparticles

The sensor developed by the scientists uses a chip coated with a porous film of special semiconducting nanoparticles. The particles are tungsten trioxide that the researchers have implanted with single atoms of silicon.

Development of the chip began seven years ago when ETH Professor Pratsinis and his colleagues discovered that tungsten trioxide nanoparticles interact with acetone if the atoms of the nanoparticles are arranged in a certain crystalline structure. The interaction reduces the electrical resistance of the chip coated with the nanoparticles, and this phenomenon can then be measured.

Originally, the idea was to use the chip to diagnose diabetes, because the exhaled breath of patients with untreated type 1 diabetes contains high concentrations of acetone. Since then, however, the scientists have shown that the sensor is in fact sensitive enough to detect the very low acetone concentrations in a person's exhalations during exercise.

The chip used in this study is the size of a 1-cent euro coin, but the researchers are working to refine the measurement technology so that it will be possible with much smaller chips. The goal is to offer the chip in a

manageably sized device. "This would allow athletes and people who want to lose weight to check for themselves when their bodies begin to burn fat so that they can optimise their training regimen," says Güntner.

Cheap, small and yet highly sensitive

Highly sensitive acetone measurements were already possible with other instruments, for instance mass spectrometers, which are large laboratory devices that cost several hundred thousand Swiss francs. The researchers are using these instruments in the current study to verify their measurements. Portable acetone breath tests also already exist, but they can only be used once and take several minutes before they show the results. "Our technology has the major benefit of being inexpensive, manageable and yet highly sensitive - plus it can take measurements in real time," says Güntner. "This makes it suitable for everyday use, while working out at a fitness centre or for people on a diet."

The scientists are now planning to continue developing their measurement method so that they can eventually market it. They already have a prototype of the instrument. The scientists are also working on developing gas sensors for other medically relevant molecules in exhalations, including ammonia to test kidney function, isoprene to test cholesterol metabolism and various aldehydes for the early detection of lung cancer.

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Reference

Güntner AT, Sievi NA, Theodore SJ, Gulich T, Kohler M, Pratsinis SE: Noninvasive body fat burn monitoring from exhaled acetone with Si-doped WO3 sensing nanoparticles. *Analytical Chemistry*, 11 September 2017, doi: 10.1021/acs.analchem.7b02843

Chemistry

Breath Instead of a Blood Test

Wed, 10/11/2017 - 9:15am by ETH Zurich

A student demonstrates the experimental setup. Photo: ETH Zurich / Simon Zogg

Blow into the tube, please. In the future, the procedure will not just be used by police checking for alcohol intoxication, but also for testing the condition of athletes and for people who want to lose that extra bit of weight. A sensor developed by ETH researchers makes it possible to measure when the body starts burning fat with a convenient breathalyzer.

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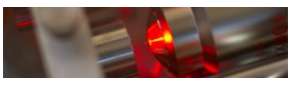

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Breath Instead of a Blood Test

Published: October 11, 2017.
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The scientists are now planning to continue developing their measurement method so that they can eventually market it. They already have a prototype of the instrument. The scientists are also working on developing gas sensors for other medically relevant molecules in exhalations, including ammonia to test kidney function, isoprene to test cholesterol metabolism and various aldehydes for the early detection of lung cancer.

Journal reference: dx.doi.org/10.1021/acs.analchem.7b02843

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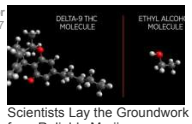

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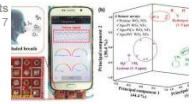
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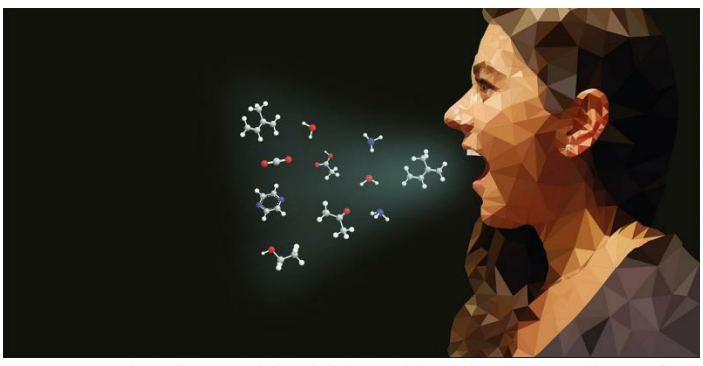
Breath Instead of a Blood Test

Tue, 10/10/2017 - 12:58pm by ETH Zurich



Sensitive measurement techniques allow over 800 molecules involved in human metabolism to be detected in a person's exhalations. One of these molecules is acetone. (Visualisations: Güntner et al. J Mater Chem B 2016, 4: 5358. Published by the Royal Society of Chemistry)

Experts advise anyone looking to shed extra kilos to eat less and exercise more. One way is with endurance training, during which the body burns not only carbohydrates such as sugar, but also fat. When exactly the body begins burning fat can now be determined by analysing, for example, biomarkers in the blood or urine. Scientists at ETH Zurich and the University Hospital Zurich have now developed a method for the highly convenient, real-time monitoring of lipolysis by testing a person's exhalations during exercise.

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"When burning fat, the body produces by-products that find their way into the blood," explains Andreas Güntner, a postdoc in the group of ETH Professor Sotiris Pratsinis. In the pulmonary alveoli, these molecules - especially the volatile ones - enter the air exhaled by the person. The most volatile of these lipid metabolites is acetone. Güntner and his colleagues have developed a small gas sensor that measures the presence of this substance. The sensor is much more sensitive than previous sensors: it can detect a single acetone molecule in hundred million molecules. It also measures acetone exclusively, so the more than 800 other known volatile components in exhalations do not affect the measurement.

Major individual differences

In collaboration with pulmonary specialists at the University Hospital Zurich led by Malcolm Kohler, Professor and Director of the Department of Pulmonology, the researchers tested the functioning of the sensor in volunteers while they exercised. The test subjects completed a one-and-a-half-hour session on a bicycle ergometer with two short breaks. Researchers asked the test subjects to blow into a tube that was connected to the acetone sensor at regular intervals.

"We were able to show how the acetone concentration in the exhalations varies greatly from person to person," says Güntner. Scientific opinion used to hold that athletes only begin burning fat after a certain period of physical exertion and on reaching a certain heart rate, but this view is now outdated. The measurements taken by the researchers in Zurich showed that lipolysis in some test subjects did, in fact, only start towards the end of the one-and-a-half-hour training session. In the other volunteers, the measurements showed that their bodies began burning fat much sooner.

Control measurements showed that the new measurement method correlated well with the concentration of the biomarker beta-hydroxybutyrate in the blood of the test subjects. This blood analysis is one of today's standard methods for monitoring lipolysis.

Interaction with nanoparticles

The sensor developed by the scientists uses a chip coated with a porous film of special semiconducting nanoparticles. The particles are tungsten trioxide that the researchers have implanted with single atoms of silicon.

Development of the chip began seven years ago when ETH Professor Pratsinis and his colleagues discovered that tungsten trioxide nanoparticles interact with acetone if the atoms of the nanoparticles are arranged in a certain crystalline structure. The interaction reduces the electrical resistance of the chip coated with the nanoparticles, and this phenomenon can then be measured.

Originally, the idea was to use the chip to diagnose diabetes, because the exhaled breath of patients with untreated type 1 diabetes contains high concentrations of acetone. Since then, however, the scientists have shown that the sensor is in fact sensitive enough to detect the very low acetone concentrations in a person's exhalations during exercise.

The chip used in this study is the size of a 1-cent euro coin, but the researchers are working to refine the measurement technology so that it will be possible with much smaller chips. The goal is to offer the chip in a manageably sized device. "This would allow athletes and people who want to lose weight to check for themselves when their bodies begin to burn fat so that they can optimise their training regimen," says Güntner.

Cheap, small and yet highly sensitive

Highly sensitive acetone measurements were already possible with other instruments, for instance mass spectrometers, which are large laboratory devices that cost several hundred thousand Swiss francs. The researchers are using these instruments in the current study to verify their measurements. Portable acetone breath tests also already exist, but they can only be used once and take several minutes before they show the results. "Our technology has the major benefit of being inexpensive, manageable and yet highly sensitive - plus it can take measurements in real time," says Güntner. "This makes it suitable for everyday use, while working out at a fitness centre or for people on a diet."

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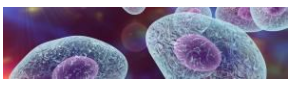

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Breath sensor tells you when you're burning fat

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10/11/2017

Scientists have developed a breath sensor that can detect when the body is burning fat.

Experts advise anyone looking to shed extra pounds to eat less and exercise more. One way is with endurance training, during which the body burns not only carbohydrates such as sugar, but also fat.

Biomarkers in the blood or urine, for example, can indicate when the body begins burning fat. Scientists have now developed a method for the highly convenient, real-time monitoring of lipolysis by testing a person's exhalations during exercise.

"When burning fat, the body produces by-products that find their way into the blood," explains Andreas Güntner, a postdoc in the group of Sotiris Pratsinis at ETH Zurich.

> *"This would allow athletes and people who want to lose weight to check for themselves when their bodies begin to burn fat…"*

In the pulmonary alveoli, these molecules—especially the volatile ones—enter the air that the person exhales. The most volatile of these lipid metabolites is acetone. Güntner and his colleagues have developed a small gas sensor that measures the presence of this substance.

The sensor is much more sensitive than previous sensors: it can detect a single acetone molecule in hundred million molecules. It also measures acetone exclusively, so the more than 800 other known volatile components in exhalations do not affect the measurement.

Unique bodies

In collaboration with pulmonary specialists, the researchers tested the functioning of the sensor in volunteers while they exercised.

The test subjects completed a one-and-a-half-hour session on a bicycle ergometer with two short breaks. Researchers asked the test subjects to blow into a tube that was connected to the acetone sensor at regular intervals.

"We were able to show how the acetone concentration in the exhalations varies greatly from person to person," says Güntner.

Scientific opinion used to hold that athletes only begin burning fat after a certain period of physical exertion and on reaching a certain heart rate, but this view is now outdated. The researchers' measurements showed that lipolysis in some test subjects did, in fact, only start towards the end of the one-and-a-half-hour training session. In the other volunteers, the measurements showed that their bodies began burning fat much sooner.

Control measurements showed that the new measurement method correlated well with the concentration of the

biomarker beta-hydroxybutyrate in the blood of the test subjects. This blood analysis is one of today's standard methods for monitoring lipolysis.

Origin of the sensor

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Exercise releases this fat-burning hormone

Originally, researchers planned to use the chip to diagnose diabetes, because the exhaled breath of patients with untreated type 1 diabetes contains high concentrations of acetone. Since then, however, the scientists have shown that the sensor is in fact sensitive enough to detect the very low acetone concentrations in a person's exhalations during exercise.

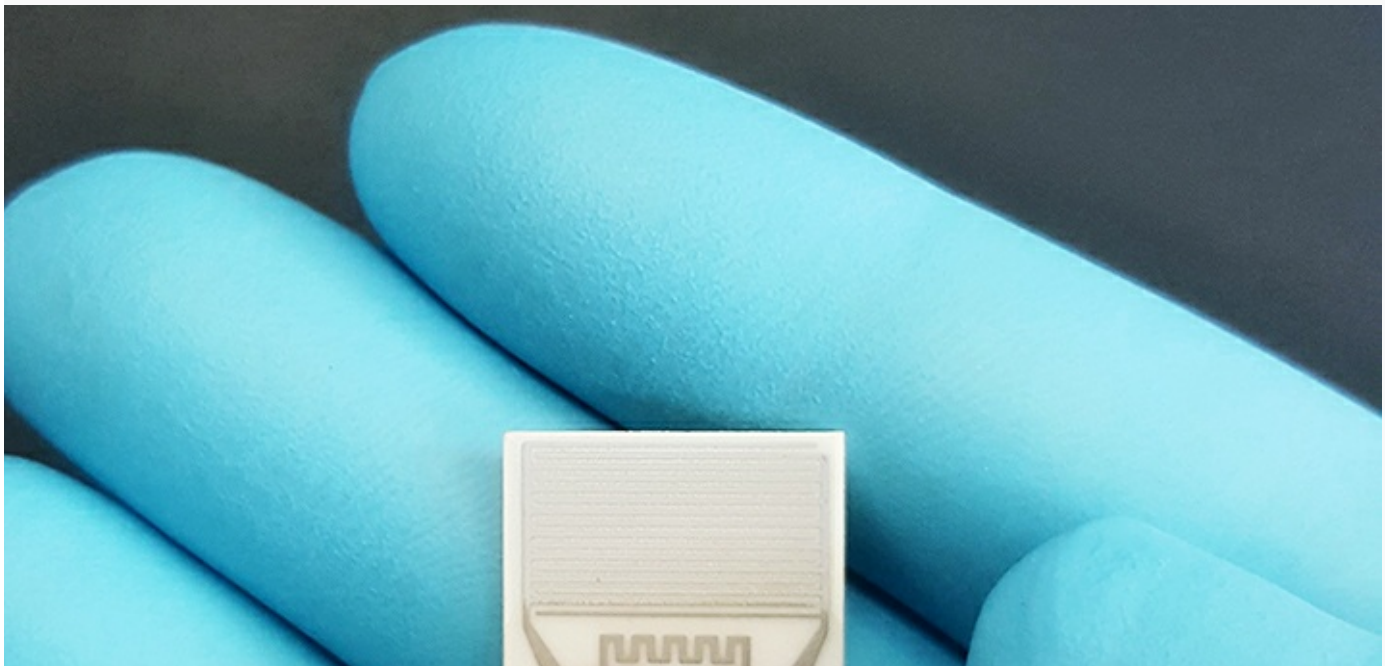
The chip used in this study is the size of a 1-cent euro coin, but the researchers are working to refine the measurement technology so that it will be possible with much smaller chips. The goal is to offer the chip in a manageably sized device.

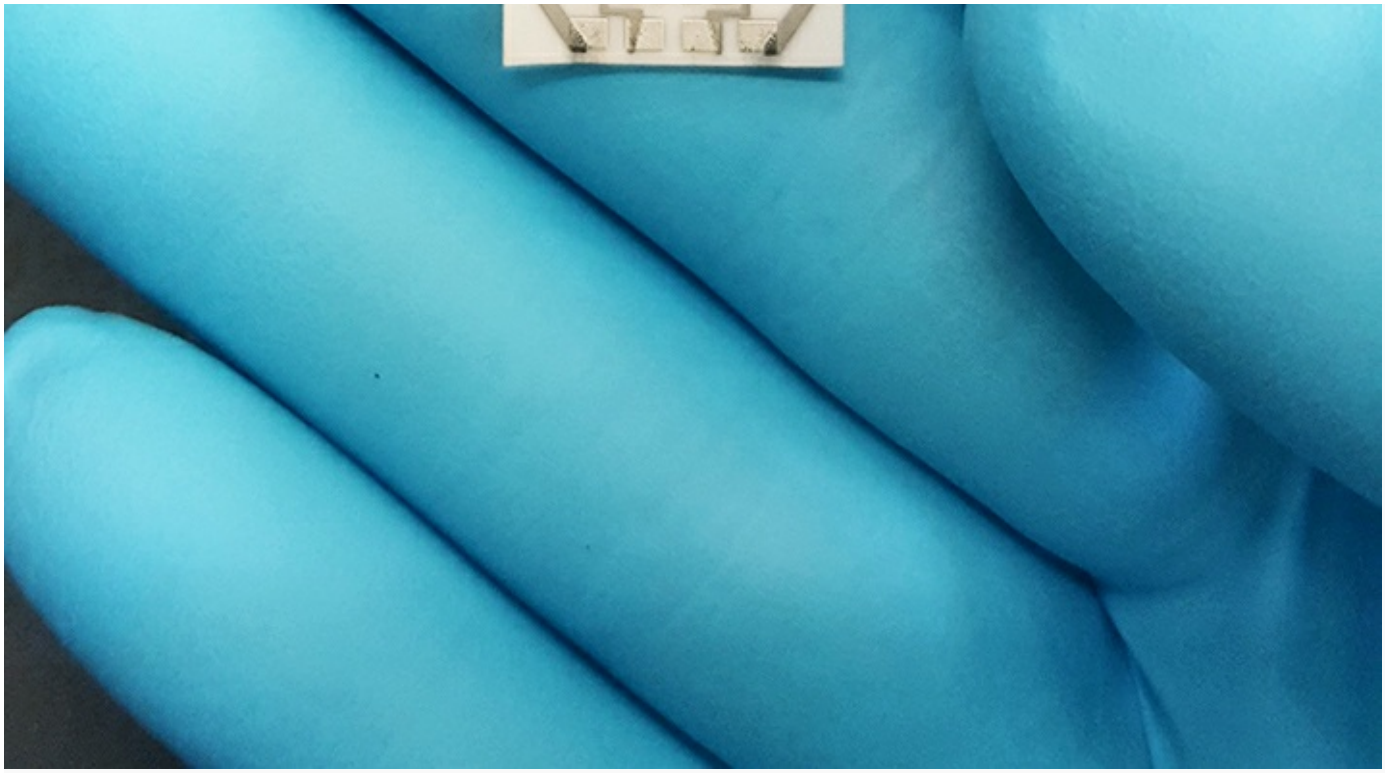
"This would allow athletes and people who want to lose weight to check for themselves when their bodies begin to burn fat so that they can optimize their training regimen," says Güntner.

Low cost, small size

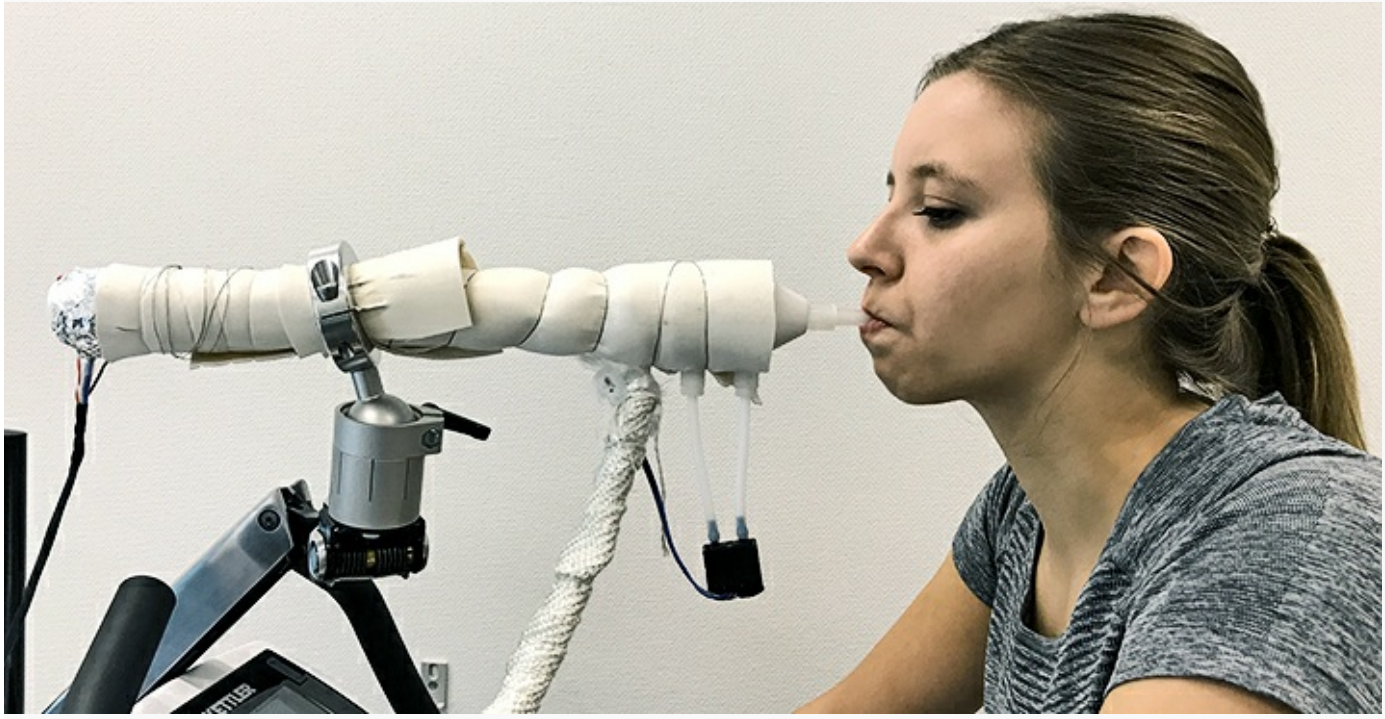
Highly sensitive acetone measurements were already possible with other instruments, for instance mass spectrometers, which are large laboratory devices that cost several hundred thousand Swiss francs. The researchers are using these instruments in the current study to verify their measurements. Portable acetone breath tests also already exist, but they can only be used once and take several minutes before they show the results.

"Our technology has the major benefit of being inexpensive, manageable, and yet highly sensitive—plus it can





The acetone measuring chip used in the study. (Credit:Andreas Güntner/ETH Zurich)



A student demonstrates the experimental setup. (Credit: Simon Zogg/ETH Zurich)

take measurements in real time," says Güntner. "This makes it suitable for everyday use, while working out at a fitness center or for people on a diet."

This enzyme controls body fat but we can't just delete it

The scientists are now planning to continue developing their measurement method so that they can eventually market it. They already have a prototype of the instrument.

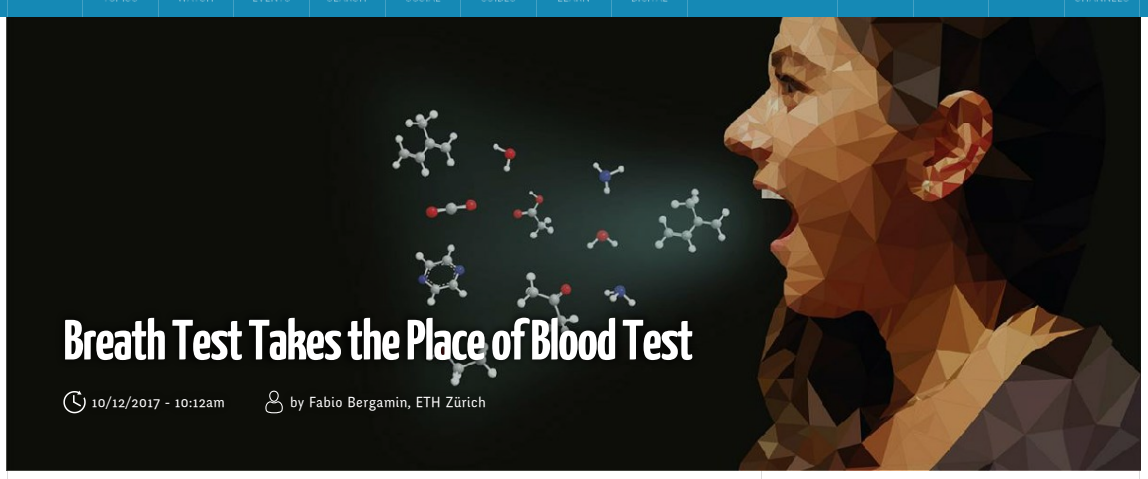
The scientists are also working on developing gas sensors for other medically relevant molecules in exhalations, including ammonia to test kidney function, isoprene to test cholesterol metabolism, and various aldehydes for the

early detection of lung cancer.

The researchers report their work in the journal *Analytical Chemistry*.

Source: ETH Zurich

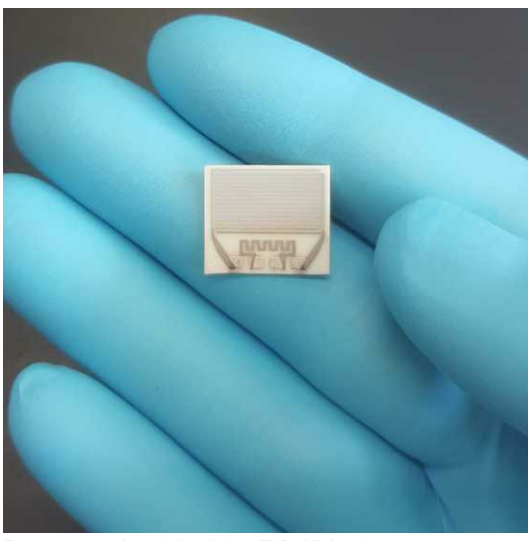
Original Study DOI: 10.1021/acs.analchem.7b02843



Breath Test Takes the Place of Blood Test

10/12/2017 - 10:12am by Fabio Bergamin, ETH Zürich

Semiconductors



The acetone measuring chip used in the study. Image: ETH Zurich/Andreas Güntner

Blow into the tube, please.

In the future, the procedure will not just be used by police checking for alcohol intoxication, but also for testing the condition of athletes and for people who want to lose that extra bit of weight. A sensor developed by ETH Zürich researchers makes it possible to measure when the body starts burning fat with a convenient breathalyzer.

Experts advise anyone looking to shed extra kilos to eat less and exercise more. One way is with endurance training, during which the body burns not only carbohydrates such as sugar, but also fat. When exactly the body begins burning fat can now be determined by analysing, for example, biomarkers in the blood or urine. Scientists at ETH Zürich and the University Hospital Zürich have now developed a method for the highly convenient, real-time monitoring of lipolysis by testing a person's exhalations during exercise.

"When burning fat, the body produces by-products that find their way into the blood," explains Andreas Güntner, a postdoc in the group of ETH Professor Sotiris Pratsinis. In the pulmonary alveoli, these molecules — especially the volatile ones — enter the air exhaled by the person. The most volatile of these lipid metabolites is acetone. Güntner and his colleagues have developed a small gas sensor that measures the presence of this substance. The sensor is much more sensitive than previous sensors: it can detect a single acetone molecule in hundred million molecules. It also measures acetone exclusively, so the more than 800 other known volatile components in exhalations do not affect the measurement.

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Source: ETH Zürich

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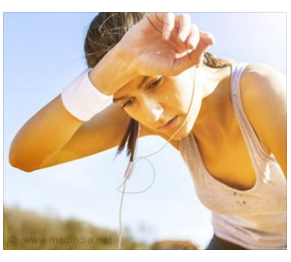
Breath Test To Analyze Fat Breakdown in The Body

by Julia Samuel on October 12, 2017 at 5:06 PM **Health Watch**

Highlights

- A highly convenient method to analyze fat breakdown in the body has been developed.
- The instrument is a breath analyzer with a gas-detecting sensor that indicates the presence of acetone.
- Results of the tests using the breath test were accurate when compared with the standard test done in the blood.

Analyzing fat breakdown during exercise by a breath test can soon be used as a replacement for blood tests.



Scientists at ETH Zurich and the University Hospital Zurich have now developed the method which is highly convenient and helps real-time monitoring of lipolysis.

'The breath analyzer works on a small gas sensor that measures the presence of acetone and produces accurate results compared to that of a standard lab test.'

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Gas- Detecting Sensor

During exercise, especially with endurance training, the body burns not only carbohydrates such as sugar, but also fat.

The most volatile of the lipid metabolites which is exhaled is acetone. Guntner and his colleagues have developed a small gas sensor that measures the presence of this substance.

The sensor is much more sensitive than previous sensors: it can detect a single acetone molecule in hundred million molecules. It also measures acetone exclusively, so the more than 800 other known volatile components in exhalations do not affect the measurement.

The sensor uses a chip coated with a porous film of special semiconducting nanoparticles made of tungsten trioxide implanted with single atoms of silicon.

Tungsten trioxide nanoparticles interact with acetone if the atoms of the nanoparticles are arranged in a certain crystalline structure. The interaction reduces the electrical resistance of the chip coated with the nanoparticles, and this phenomenon can then be measured. The size of the chip is 1-cent euro coin, but will be refined to smaller chips.

"This would allow athletes and people who want to lose weight to check for themselves when their bodies begin to burn fat so that they can optimise their training regimen," says Guntner.

Breath Analysis in Par With Standard Blood Test

The research team tested the functioning of the sensor in volunteers during exercise. The test subjects were asked to complete a one-and-a-half-hour session on a bicycle ergometer with two short breaks. The test subjects were asked to blow into a tube that was connected to the acetone sensor at regular intervals.

"We were able to show how the acetone concentration in the exhalations varies greatly from person to person," says Guntner. Scientific opinion used to hold that athletes only begin burning fat after a certain period of physical exertion and on reaching a certain heart rate, but this view is now outdated.

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Control measurements showed that **the new measurement method correlated well with the concentration of the biomarker beta-hydroxybutyrate in the blood of the test subjects**. This blood analysis is one of today's standard methods for monitoring lipolysis.

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Reference

1. Güntner AT, Sievi NA, Theodore SJ, Gulich T, Kohler M, Pratsinis SE. Noninvasive body fat burn monitoring from exhaled acetone with Si-doped WO3 sensing nanoparticles. *Analytical Chemistry*;(2017) doi: 10.1021/acs.analchem.7b02843.

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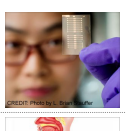

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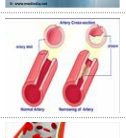

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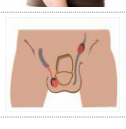

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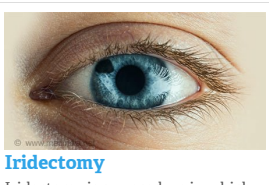

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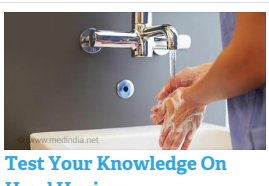

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Scientists at ETH Zurich and the University Hospital Zurich have now developed the method which is highly convenient and helps real-time monitoring of lipolysis.

> 'The breath analyzer works on a small gas sensor that measures the presence of acetone and produces accurate results compared to that of a standard lab test.'

"When burning fat, the body produces by-products that find their way into the blood," explains Andreas Guntner, a postdoc in the group of ETH Professor Sotiris Pratsinis. In the pulmonary alveoli, these molecules - especially the volatile ones - enter the air exhaled by the person.

Gas- Detecting Sensor

During exercise, especially with endurance training, the body burns not only carbohydrates such as sugar, but also fat.

The most volatile of the lipid metabolites which is exhaled is acetone. Guntner and his colleagues have developed a small gas sensor that measures the presence of this substance.

The sensor is much more sensitive than previous sensors: it can detect a single acetone molecule in hundred million molecules. It also measures acetone exclusively, so the more than 800 other known volatile components in exhalations do not affect the measurement.

The sensor uses a chip coated with a porous film of special semiconducting nanoparticles made of tungsten trioxide implanted with single atoms of silicon.

Tungsten trioxide nanoparticles interact with acetone if the atoms of the nanoparticles are arranged in a certain crystalline structure. The interaction reduces the electrical resistance of the chip coated with the nanoparticles, and this phenomenon can then be measured. The size of the chip is 1-cent euro coin, but will be refined to smaller chips.

"This would allow athletes and people who want to lose weight to check for themselves when their bodies begin to burn fat so that they can optimise their training regimen," says Guntner.

Breath Analysis in Par With Standard Blood Test

The research team tested the functioning of the sensor in volunteers during exercise. The test subjects were asked to complete a one-and-a-half-hour session on a bicycle ergometer with two short breaks. The test subjects were asked to blow into a tube that was connected to the acetone sensor at regular intervals.

"We were able to show how the acetone concentration in the exhalations varies greatly from person to person," says Guntner. Scientific opinion used to hold that athletes only begin burning fat after a certain period of physical exertion and on reaching a certain heart rate, but this view is now outdated.

Lipolysis in some test subjects only started towards the end of the one-and-a-half-hour training session. In the other volunteers, the measurements showed that their bodies began burning fat much sooner.

Control measurements showed that **the new measurement method correlated well with the concentration of the biomarker beta-hydroxybutyrate in the blood of the test subjects**. This blood analysis is one of today's standard methods for monitoring lipolysis.

"Our technology has the major benefit of being inexpensive, manageable and yet highly sensitive - plus it can take measurements in real time," says Guntner. "This makes it suitable for everyday use, while working out at a fitness centre or for people on a diet."

The scientists are also working on developing gas sensors for other medically relevant molecules in exhalations, including ammonia to test kidney function, isoprene to test cholesterol metabolism and various aldehydes for the early detection of lung cancer.

Reference

1. Güntner AT, Sievi NA, Theodore SJ, Gulich T, Kohler M, Pratsinis SE. Noninvasive body fat burn monitoring from exhaled acetone with Si-doped WO3 sensing nanoparticles. *Analytical Chemistry*;(2017) doi: 10.1021/acs.analchem.7b02843.

Source: Medindia

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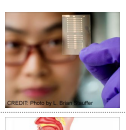

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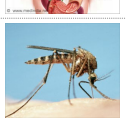

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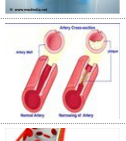

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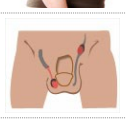

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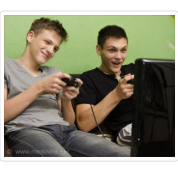

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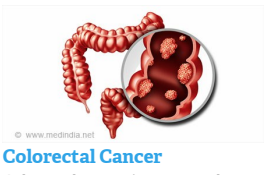

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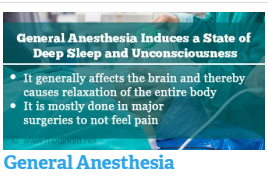

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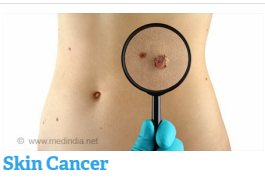

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Fettabbau über Atemluft messen

ZÜRICH | ETH-Forscher haben einen Sensor entwickelt, der mit einer einfachen Analyse der Atemluft einer Person anzeigt, ob deren Körper Fett verbrennt oder nicht. Das Ziel ist ein Messgerät für den Alltagsgebrauch – für das Training oder während einer Diät.

Wann der Körper damit beginnt, Fett zu verbrennen, lässt sich heute unter anderem mit einer Blutanalyse bestimmen. Wissenschaftler der ETH Zürich und des Universitätsspitals Zürich stellen nun in den ETH-News eine Methode vor, mit der sich der Fettabbau «ganz einfach und in Echtzeit in der Atemluft» nachweisen lässt. Beim Fettabbau im Körper entstehen Nebenprodukte, die ins Blut gelangen, wird Andreas Güntner, Postdoc in der Gruppe von ETH-Professor Sotiris Pratsinis, im Artikel zitiert. Gerade die leichtflüchtigen Moleküle unter ihnen können in den Lungenbläschen in die Atemluft übertreten.

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Nachweis im Fitnessraum

Vor sieben Jahren war vorgesehen, diesen Chip zur Diagnose von Diabetes einzusetzen. Mittlerweile konnten die Wissenschaftler nachweisen, dass das Messgerät aber derart empfindlich ist, dass es auch die sehr geringen Azeton-Konzentrationen im Atem von Sporttreibenden aufspürt.

Laut ETH-News kann der Chip einzelne Azeton-Moleküle in hundert Millionen anderen Molekülen nachweisen.

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Verfeinern und weiterentwickeln

Die Wissenschaftler wollen nun ihre Messtechnik weiter verfeinern: Mit einem deutlich kleineren Chip könnte ein handliches Gerät für den Alltagsgebrauch entstehen. «Damit können Sportler und Abnehmwillige individuell überprüfen, wann ihre Körper beginnen, Fett zu verbrennen, um so ihr Training zu optimieren», sagt Güntner.

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Atemluftmessung

10. Oktober 2017 14:50; *Akt: 10.10.2017 14:52*

ETH entwickelt günstigen Fettweg-Sensor

Verbrennt der Körper Fett, setzt er Azeton frei. Ein neuer Sensor der ETH Zürich kann dieses in der Atemluft messen und so helfen, das Training zu optimieren.

So funktioniert die Atemanalyse. (Video: ETH Zürich)

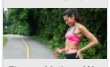
Wer überzählige Kilos loswerden möchte, sollte bekanntlich weniger essen und sich mehr bewegen. Ausdauertraining ist eine Möglichkeit, um Fett zu verbrennen. Um festzustellen, ab wann der Körper beginnt, Fett zu verbrennen, brauchte es bisher aber umständliche Blut- oder Urinanalysen. Dank einer Entwicklung der ETH und des Universitätsspitals Zürich lässt sich der Fettabbau nun ganz einfach und in Echtzeit in der Atemluft von Sporttreibenden nachweisen, wie das Video oben zeigt.

(jcg)

Bildstrecken

Wo geht das Fett hin, wenn wir es verbrennen?

Zum Thema



Fitness-Mythen: Wo geht das Fett hin, wenn wir es verbrennen?

Projekt 2700 Zürich–Moskau: Wann es sich lohnt, auf leeren Magen zu trainieren

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Anklagen gegen «Lion Mama» fallen gelassen

Die Unterstützung der Öffentlichkeit war riesig: Gegen eine Frau, die den Vergewaltiger ihrer Tochter erstochen hatte, wird keine Anklage erhoben.

Unterbruch auf der Bahnstrecke Luzern–Zug

Auf der Linie Luzern–Zug ist die Strecke zwischen Rotkreuz und Cham für den Bahnverkehr unterbrochen.

13 Kommentare

Eigenen Beitrag verfassen

Die beliebtesten Leser-Kommentare

o`chrafeas am 10.10.2017 15:25 — Diesen Beitrag melden (19 / 6)

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Also Ketose Messungen gibt es schon eine Weile. Blut, Urin und Speichel. ps: der Speicheltest als "handliches Gerät" sicher schon seit 2010

Maler50 am 10.10.2017 15:06 via — Diesen Beitrag melden (14 / 7)

Gut für Sportler

Na dann werden sich die Sportler extrem freuen!

LowCarb am 10.10.2017 15:33 — Diesen Beitrag melden (9 / 7)

gibt es schon

Solche Geräte, welche Aceton in der Atemluft messen gibt es schon. Kostet um 200$ herum. Neu wäre hingegen ein Gerät, welches kontinuerlich misst und ohne dass man dazu spezielle Atemtechniken anwenden muss.

Die neusten Leser-Kommentare

Mike Zac am 10.10.2017 17:25 via — Diesen Beitrag melden (2 / 0)

Wann kommt das Zeug?

Das ist sehr nützlich. Apps oder Ergometer zeigen nur Verbrennung kcal/h. Aber ob das stimmt weiss ich nicht. Bei 60min 1100kcal/h und gesunder Ernährung sollte schon was verbrennt werden. Hab in 2W schon 3kg auf 80kg abgenommen.

Antwort an Mike Zac

FernLeser am 10.10.2017 17:04 — Diesen Beitrag melden (1 / 3)

Geht auch simpler

Man könnte auch einfach aufhöhren seinen Körper mit Zucker zu vergiften. Dann läuft er dauern auf Ketose. Nur scheint Zuckersucht noch immer gut akzeptiert zu sein, wie man seinen Mittmenschen ansieht. Für Leber und Herzschäden kommen ja die Versicherungen auf. Genauso wie für all die anderen Nebenwirkungen wie Insulinresistenz und Diabethes.

Antwort an FernLeser

BombayStyle@gmx.ch am 10.10.2017 16:36 via — Diesen Beitrag melden (3 / 2)

Sehr notwendige Erfindung

Das ist nun ein extra für Leute die so wieso mehr als genug für den Körper tun. Mollyladys brauchen bitte jetzt jubeln. Danke vielmol

Antwort an BombayStyle@gmx.ch

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gibt es schon

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Das ist die grösste Gezeitenwelle der Welt
Keine Zecken-Impfung – immer mehr FSME-Fälle

Vorbeugende Wirkung
1 Stunde Sport pro Woche schützt vor Depressionen

Regelmässige Bewegung hilft nicht nur, körperlich fit zu bleiben. Laut Forschern sorgt sie auch dafür, trübe Gedanken dauerhaft auf Abstand zu halten.

Stundenlanges Zocken
Frau nach Game-Marathon auf einem Auge blind

Eine 21-Jährige ist in China teilweise erblindet, nachdem sie beinahe einen ganzen Tag lang an ihrem Smartphone gespielt hatte.

Versuch mit Rekruten
Weniger Raucher wegen Snus? Im Gegenteil

Forscher haben untersucht, ob Schnupftabak und Snus bei Schweizer Rekruten zu weniger Zigarettenkonsum führen.

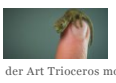
Ruthenium-106
Woher stammt die Radioaktivität im Tessin?

Vor kurzem wurde in der Schweiz sowie in Deutschland, Italien und Österreich Ruthenium-106 nachgewiesen. Experten vermuten die Quelle in Russland.

Geheimdokument
Sowjets wollten auf dem Mond Atombombe zünden

Es wäre die ultimative Machtdemonstration gewesen: Laut einem Geheimdokument wollten die Sowjets im All eine Nuklear-Show veranstalten.

Weltpremiere
Zoo kann erstmals seltene Chamäleons züchten



Freude herrscht in Grossbritannien: Zum ersten Mal weltweit sind dort in Gefangenschaft Chamäleons der Art Trioceros montium zur Welt gekommen.

Spurenelemente
43 Kilogramm Gold landen jährlich im Abwasser

Spurenelemente im Wert von rund drei Millionen Franken fliessen durch unsere Röhren. Eine Rückgewinnung lohnt sich aber kaum.

Gefährliche Hirnhautentzündung
Keine Zecken-Impfung – immer mehr FSME-Fälle

Seit Jahresbeginn sind 214 Menschen an einer Hirnhautentzündung erkrankt, die von einer Zecke verursacht worden war. So viele wie seit zehn Jahren nicht mehr.

Schädliche Gedanken
Behalten Sie keine Geheimnisse für sich

Wer Geheimnisse mit sich herumträgt, kann sowohl seiner Gesundheit als auch seiner Karriere Schaden zufügen.

ETH misst Fettabbau über Atemluft

Vor 3 Stunden / Kommentare

Eine Studentin demonstriert das Gerät, das aufgrund der Atemluft den Fettabbau im Körper nachweist. © ETH Zürich, Simon Zogg

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(SDA)

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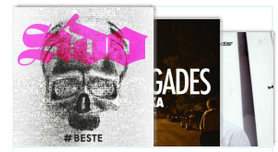

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Eine Studentin demonstriert das Gerät, das aufgrund der Atemluft den Fettabbau im Körper nachweist. (ETH ZÜRICH, SIMON ZOGG)

Wann der Körper damit beginnt, Fett zu verbrennen, lässt sich heute unter anderem mit einer Blutanalyse bestimmen. Wissenschaftler der ETH Zürich und des Universitätsspitals Zürich stellen nun in den ETH-News eine Methode vor, mit der sich der Fettabbau «ganz einfach und in Echtzeit in der Atemluft» nachweisen lässt.

Beim Fettabbau im Körper entstehen Nebenprodukte, die ins Blut gelangen, wird Andreas Güntner, Postdoc in der Gruppe von ETH-Professor Sotiris Pratsinis, im Artikel zitiert. Gerade die leichtflüchtigen Moleküle unter ihnen können in den Lungenbläschen in die Atemluft übertreten.

Güntner und seine Kollegen haben einen kleinen Gassensor entwickelt, welcher Azeton, das flüchtigste Molekül der Fettabbauprodukte, misst. Der Chip, der derzeit noch die Grösse eines Fünf-Rappen-Stücks aufweist, ist mit einem porösen Film aus speziellen halbleitenden Nanopartikeln beschichtet.

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Die Wissenschaftler wollen nun ihre Messtechnik weiter verfeinern: Mit einem deutlich kleineren Chip könnte ein handliches Gerät für den Alltagsgebrauch entstehen. «Damit können Sportler und Abnehmwillige individuell überprüfen, wann ihre Körper beginnen, Fett zu verbrennen, um so ihr Training zu optimieren», sagt Güntner.

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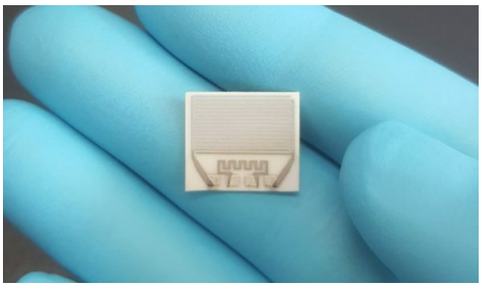
(SDA)

Publiziert am 10.10.2017 | Aktualisiert um 15:04 Uhr

Medicine

Wed Oct 11, 2017 3:40

Breath Instead of Blood Test



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TEHRAN (FNA)- Blow into the tube, please. In the future, the procedure will not just be used by police checking for alcohol intoxication, but also for testing the condition of athletes and for people who want to lose that extra bit of weight. A new sensor makes it possible to measure when the body starts burning fat with a convenient breathalyser.

"When burning fat, the body produces by-products that find their way into the blood," explains Andreas Güntner, a postdoc in the group of ETH Professor Sotiris Pratsinis. In the pulmonary alveoli, these molecules -- especially the volatile ones -- enter the air exhaled by the person. The most volatile of these lipid metabolites is acetone. Güntner and his colleagues have developed a small gas sensor that measures the presence of this substance. The sensor is much more sensitive than previous sensors: it can detect a single acetone molecule in hundred million molecules. It also measures acetone exclusively, so the more than 800 other known volatile components in exhalations do not affect the measurement.

Major individual differences

In collaboration with pulmonary specialists at the University Hospital Zurich led by Malcolm Kohler, Professor and Director of the Department of Pulmonology, the researchers tested the functioning of the sensor in volunteers while they exercised. The test subjects completed a one-and-a-half-hour session on a bicycle ergometer with two short breaks. Researchers asked the test subjects to blow into a tube that was connected to the acetone sensor at regular intervals.

"We were able to show how the acetone concentration in the exhalations varies greatly from person to person," says Güntner. Scientific opinion used to hold that athletes only begin burning fat after a certain period of physical exertion and on reaching a certain heart rate, but this view is now outdated. The measurements taken by the researchers in Zurich showed that lipolysis in some test subjects did, in fact, only start towards the end of the one-and-a-half-hour training session. In the other volunteers, the measurements showed that their bodies began burning fat much sooner.

Control measurements showed that the new measurement method correlated well with the concentration of the biomarker beta-hydroxybutyrate in the blood of the test subjects. This blood analysis is one of today's standard methods for monitoring lipolysis.

Interaction with nanoparticles

The sensor developed by the scientists uses a chip coated with a porous film of special semiconducting nanoparticles. The particles are tungsten trioxide that the researchers have implanted with single atoms of silicon.

Development of the chip began seven years ago when ETH Professor Pratsinis and his colleagues discovered that tungsten trioxide nanoparticles interact with acetone if the atoms of the nanoparticles are arranged in a certain crystalline structure. The interaction reduces the electrical resistance of the chip coated with the nanoparticles, and this phenomenon can then be measured.

Originally, the idea was to use the chip to diagnose diabetes, because the exhaled breath of patients with untreated type 1 diabetes contains high concentrations of acetone. Since then, however, the scientists have shown that the sensor is in fact sensitive enough to detect the very low acetone concentrations in a person's exhalations during exercise.

The chip used in this study is the size of a 1-cent euro coin, but the researchers are working to refine the measurement technology so that it will be possible with much smaller chips. The goal is to offer the chip in a manageably sized device. "This would allow athletes and people who want to lose weight to check for themselves when their bodies begin to burn fat so that they can optimise their training regimen," says Güntner.

Cheap, small and yet highly sensitive

Highly sensitive acetone measurements were already possible with other instruments, for instance mass spectrometers, which are large laboratory devices that cost several hundred thousand Swiss francs. The researchers are using these instruments in the current study to verify their measurements. Portable acetone breath tests also already exist, but they can only be used once and take several minutes before they show the results. "Our technology has the major benefit of being inexpensive, manageable and yet highly sensitive -- plus it can take measurements in real time," says Güntner. "This makes it suitable for everyday use, while working out at a fitness centre or for people on a diet."

The scientists are now planning to continue developing their measurement method so that they can eventually market it. They already have a prototype of the instrument. The scientists are also working on developing gas sensors for other medically relevant molecules in exhalations, including ammonia to test kidney function, isoprene to test cholesterol metabolism and various aldehydes for the early detection of lung cancer.

Dieses Gerät misst in der Atemluft, wie gut jemand Fett verbrennt

Eine Studentin demonstriert das Gerät, das aufgrund der Atemluft den Fettabbau im Körper nachweist. | *(ETH Zürich, Simon Zogg)*

FORSCHUNG · ETH-Forscher haben einen Sensor entwickelt, der mit einer einfachen Analyse der Atemluft einer Person anzeigt, ob deren Körper Fett verbrennt oder nicht. Das Ziel ist ein Messgerät für den Alltagsgebrauch - für das Training oder während einer Diät.

10. Oktober 2017, 14:27

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Nachweis im Fitnessraum

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Verfeinern und weiterentwickeln

Die Wissenschaftler wollen nun ihre Messtechnik weiter verfeinern: Mit einem deutlich kleineren Chip könnte ein handliches Gerät für den Alltagsgebrauch entstehen. "Damit können Sportler und Abnehmwillige

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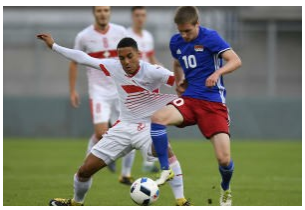

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Fürs Training oder die Diät: Sensor misst Fettabbau per Atemluft

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Neuer Sensor entwickelt: Fettabbau über die Atemluft messen

Forscher aus der Schweiz haben einen Sensor entwickelt, mit dem man einfach per Atemanalyse messen kann, wann der Körper beginnt, Fett zu verbrennen. Laut den Wissenschaftlern eignet sich die Technik, „für den Alltagsgebrauch, fürs Training in einem Fitnesscenter oder während einer Diät."

Ausdauersport hilft beim Abnehmen

Untersuchungen zufolge leben immer mehr Übergewichtige in Deutschland. Viele versuchen , ihren dicken Bauch wieder loszuwerden, indem sie bestimmte Lebensmittel meiden beziehungsweise eine Diät machen. Doch das allein reicht meist nicht aus. Um Bauchfett abzubauen, ist es in der Regel auch nötig, sich regelmäßig zu bewegen. Ausdauersport eignet sich hier besonders gut. Mit einem neu entwickelten Sensor kann man dabei künftig ganz einfach per Atemanalyse messen, wann der Körper beginnt, Fett zu verbrennen.

Forscher haben einen Sensor entwickelt, mit dem man über die Atemluft den Fettabbau messen kann. Die Technik eignet sich für den Sport oder bei einer Diät. (Bild: Firma V/fotolia.com)

Fettabbau ganz einfach in der Atemluft nachweisbar

Unser Körper verbrennt beim Ausdauertraining nicht nur Kohlenhydrate wie Zucker, sondern auch Fette. Wann der Körper beginnt, Fett zu verbrennen, lässt sich heute zum Beispiel mit der Analyse von Biomarkern im Blut oder im Urin bestimmen.

Wissenschaftler der Eidgenössischen Technischen Hochschule (ETH) Zürich und des Universitätsspitals Zürich (USZ) entwickelten nun eine Methode, mit der sich der Fettabbau ganz einfach und in Echtzeit in der Atemluft von Sporttreibenden nachweisen lässt.

„Beim Fettabbau im Körper entstehen Nebenprodukte, die ins Blut gelangen", erklärte Andreas Güntner, Postdoc in der Gruppe von ETH-Professor Sotiris Pratsinis laut den „ETH-News".

In den Lungenbläschen können diese Moleküle in die Atemluft übertreten, besonders die leichtflüchtigen unter ihnen. Das flüchtigste dieser Fettabbauprodukte ist Azeton.

Die Schweizer Forscher haben einen kleinen Gassensor entwickelt, der diesen Stoff misst. Ihr Sensor ist viel empfindlicher als bisherige Sensoren: er kann einzelne Azeton-Moleküle in hundert Millionen anderer Moleküle nachweisen.

Außerdem misst der Sensor nur Azeton und nichts anderes; die weiteren über 800 bekannten flüchtigen Komponenten in der Atemluft beeinflussen die Messung nicht.

Im Fachmagazin „Analytical Chemistry" berichten die Experten über ihre neue Entwicklung.

Funktion des Sensors bei Sporttreibenden überprüft

In Zusammenarbeit mit Lungenspezialisten am Universitätsspital Zürich überprüften die Wissenschaftler die Funktion des Sensors bei sporttreibenden Freiwilligen. Diese absolvierten eineinhalb Stunden Training auf einem Fahrradergometer mit zwei kurzen Pausen.

In regelmäßigen Abständen ließen die Forschenden die Probanden in ein Röhrchen blasen, das mit dem Azeton-Sensor verbunden war.

„Wir konnten damit zeigen, dass sich der Azeton-Ausstoss in der Atemluft von Mensch zu Mensch stark unterscheidet", erläuterte Güntner.

Die frühere und mittlerweile überholte Lehrmeinung besagte, dass Sporttreibende erst nach einer bestimmten Trainingszeit und Herzfrequenz beginnen, Fett zu verbrennen.

In den Messungen der Wissenschaftler setzte die Fettverbrennung bei einigen Probanden tatsächlich erst gegen Ende der eineinhalbstündigen Trainingseinheit ein. Bei anderen Freiwilligen zeigten die Messungen, dass ihr Körper schon viel früher Fett verbrennt.

Kontrollmessungen ergaben, dass die neue Messmethode gut übereinstimmt mit der Konzentration des Biomarkers Beta-Hydroxybutyrat im Blut der Studienteilnehmer. Diese Blutanalyse ist eine der heutigen Standardmethoden, um den Fettabbau nachzuverfolgen.

Chip sollte ursprünglich zur Diabetes-Diagnose verwendet werden

Bei dem von den Wissenschaftlern entwickelten Sensor handelt es sich um einen Chip, der mit einem porösen Film aus speziellen halbleitenden Nanopartikeln beschichtet ist. Die Partikel bestehen aus Wolframtrioxid, das die Forschenden mit einzelnen Silizium-Atomen versetzt hatten.

Angefangen hat die Entwicklung dieses Chips bereits vor sieben Jahren. Damals entdeckten ETH-Forscher, dass Wolframtrioxid-Nanopartikel mit Azeton wechselwirken, sofern die Atome der Nanopartikel in einer bestimmten Kristallstruktur angeordnet sind.

Die Wechselwirkung verringert den elektrischen Widerstand des mit den Nanopartikeln beschichteten Chips, was messbar ist.

Ursprünglich war die Idee, den Chip zur Diagnose von Diabetes zu verwenden. Denn in der Atemluft von Patienten mit unbehandeltem Diabetes Typ 1 lassen sich hohe Azeton-Konzentration nachweisen.

Mittlerweile konnten die Wissenschaftler jedoch zeigen, dass der Sensor empfindlich genug ist, um die sehr geringen Azeton-Konzentrationen im Atem von Sporttreibenden nachzuweisen.

Die Forscher sind dabei die Messtechnik soweit zu verfeinern, dass sie mit deutlich kleineren als in der Studie verwendeten Chips möglich werden soll. Sie sollen in ein handliches Gerät passen.

„Damit können Sportler und Abnehmwillige individuell überprüfen, wann ihr Körper beginnt, Fett zu verbrennen, um so ihr Training zu optimieren", sagte Güntner.

Technik für den Alltagsgebrauch

Hochempfindliche Azeton-Messungen konnte man schon bisher mit anderen Messgeräten – sogenannten Massenspektrometern – machen. Dabei handelt es sich jedoch um große und sehr teure Laborgeräte.

Solche nutzen die Forschenden in der aktuellen Studie, um ihre Messungen zu überprüfen. Auch gibt es bereits tragbare Geräte für die Azeton-Messung im Atem. Diese kann man jedoch nur einmal verwenden, und sie zeigen das Resultat erst nach einigen Minuten an.

„Unsere Technik hingegen hat die grossen Vorteile, dass sie günstig, handlich und dennoch hochempfindlich ist sowie ausserdem Echtzeitmessungen ermöglicht", so Güntner. „Sie eignet sich daher für den Alltagsgebrauch, fürs Training in einem Fitnesscenter oder während einer Diät."

Die Wissenschaftler planen nun, ihre Messmethode zur Marktreife weiterzuentwickeln. Einen Messgerät-Prototypen gibt es bereits.

Zugleich sind die Wissenschaftler daran, Gassensoren für weitere medizinisch interessante Moleküle in der Atemluft zu entwickeln, darunter solche für Ammoniak, mit dem sich die Nierenfunktion überprüfen lässt, Isopren, um den Cholesterin-Stoffwechsel zu untersuchen, und verschiedene Aldehyde für die Früherkennung von Lungenkrebs. (ad)

12 Oct 2017 06:56PM
(Updated: 16 Oct 2017 10:26PM)

Health

New breath test being developed to help weight-watchers shed kilos

Your breath could indicate how successful you are at losing weight. (Photo: Tero Vesalainen/Pixabay)

ZURICH: If you're looking to lose weight, knowing when your body starts to burn fat during exercise - a process known as lipolysis - is important.

Instead of analysing blood or urine samples for biomarkers, lipolysis can now be measured by simply blowing into a tube, according to a report in Science Daily.

Scientists at ETH Zurich and the University Hospital Zurich have developed a small gas sensor that tests for the presence of acetone in a person's exhalations during exercise. This allows for the real-time monitoring of lipolysis. Acetone is one of the body's by-products that finds its way into the person's breath when fat is burned.

Dr Andreas Guntner told Science Daily that the sensor can detect a single acetone molecule in hundred million molecules. It also measures acetone exclusively, so the other known volatile components, which amount to more than 800 in a person's breath, do not affect the measurement.

Together with pulmonary specialists at the University Hospital Zurich, Dr Guntner and his colleagues tested the sensor on volunteers after they had each completed a one-and-a-half-hour session on a bicycle ergometer with two short breaks. "We were able to show how the acetone concentration in the exhalations varies greatly from person to person," said Dr Guntner.

According to the Science Daily report, the sensor has a chip coated with a porous film of tungsten trioxide nanoparticles.

The chip was developed seven years ago when Professor Sotiris Pratsinis and his colleagues from ETH Zurich discovered that tungsten trioxide nanoparticles interacted with acetone if the nanoparticles' atoms were arranged in a certain crystalline structure. This interaction reduces the electrical resistance of the chip which can be measured.

This chip could help you to lose weight by measuring your breath. (Photo: ETH Zurich/Andreas Guntner)

The report mentioned that the chip was originally meant to diagnose diabetes because the breath of patients with untreated Type 1 diabetes contains high concentrations of acetone. But since the sensor was found sensitive enough to detect the low acetone concentrations in a person's exhalations during exercise, the researchers changed tack.

Although the chip is already the size of a one-cent Euro coin in the study, according to Science Daily, the researchers are working on making it even smaller.

"This would allow athletes and people who want to lose weight to check for themselves when their bodies begin to burn fat so that they can optimise their training regimen," says Dr Guntner.

Source: CNA/bk

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Scientists develop new method for monitoring lipolysis by testing person's exhaled breath

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October 10, 2017

Experts advise anyone looking to shed extra kilos to eat less and exercise more. One way is with endurance training, during which the body burns not only carbohydrates such as sugar, but also fat. When exactly the body begins burning fat can now be determined by analyzing, for example, biomarkers in the blood or urine. Scientists at ETH Zurich and the University Hospital Zurich have now developed a method for the highly convenient, real-time monitoring of lipolysis by testing a person's exhalations during exercise.

"When burning fat, the body produces by-products that find their way into the blood," explains Andreas Güntner, a postdoc in the group of ETH Professor Sotiris Pratsinis. In the pulmonary alveoli, these molecules - especially the volatile ones - enter the air exhaled by the person. The most volatile of these lipid metabolites is acetone. Güntner and his colleagues have developed a small gas sensor that measures the presence of this substance. The sensor is much more sensitive than previous sensors: it can detect a single acetone molecule in hundred million molecules. It also measures acetone exclusively, so the more than 800 other known volatile components in exhalations do not affect the measurement.

Major individual differences

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Source:
https://www.ethz.ch/en/news-and-events/eth-news/news/2017/10/breath-instead-of-a-blood-test.html

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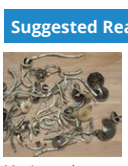
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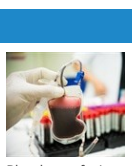
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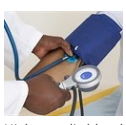
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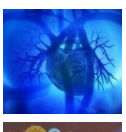
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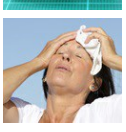
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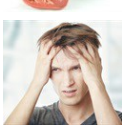
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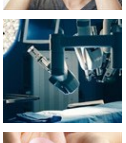
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Sensor misst Atemluft und zeigt an, ob der Körper Fett verbrennt

Ob der Körper Fett verbrennt, zeigte bisher nur eine Blutuntersuchung. Forscher arbeiten an einem Messgerät für den Atem, das bei Diäten oder im Training verwendet werden kann

11. Oktober 2017, 00:00 · 82 Postings

Forscher der Eidgenössischen Technischen Hochschule (ETH) Zürich haben einen Sensor entwickelt, der mit einer einfachen Analyse der Atemluft einer Person anzeigt, ob deren Körper Fett verbrennt oder nicht. Das Ziel ist ein Messgerät für den Alltagsgebrauch – für das Training oder während einer Diät.

Wann der Körper damit beginnt, Fett zu verbrennen, lässt sich heute unter anderem mit einer Blutanalyse bestimmen. Wissenschaftler der ETH Zürich und des Universitätsspitals Zürich stellen nun in den "ETH News" eine Methode vor, mit der sich der Fettabbau "ganz einfach und in Echtzeit in der Atemluft" nachweisen lässt.

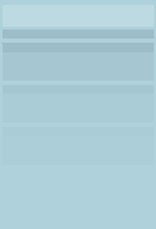
Beim Fettabbau im Körper entstehen Nebenprodukte, die ins Blut gelangen, wird Andreas Güntner, Postdoc in der Gruppe von ETH-Professor Sotiris Pratsinis, in einem Artikel erläutert. Gerade die leichtflüchtigen Moleküle unter ihnen können in den Lungenbläschen in die Atemluft übertreten.

Trainieren und dabei in Echtzeit überprüfen, ob man gerade abnimmt – an einem solchen Tool arbeiten Forscher in der Schweiz.

Foto: iStock

Diagnose von Diabetes

Güntner und seine Kollegen haben einen kleinen Gassensor entwickelt, der Azeton, das Rückfrage Molekül der Fettabbauprodukte, misst. Der Chip, der derzeit noch die Größe eines Geldstücks aufweist, ist mit einem porösen Film aus speziellen halbleitenden Nanopartikeln beschichtet.



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Die Forscher schickten nun Probanden auf den Fahrradergometer: Diese pedalierten während einerinhalb Stunden und bliesen regelmäßig in ein Röhrchen. "Wir konnten zeigen, dass sich der Azetonanstieg in der Atemluft von Mensch zu Mensch stark unterscheidet", sagte Güntner.

Training optimieren

Die frühere, mittlerweile überholte Lehrmeinung besagte, dass Sportlitbende erst nach einer bestimmten Trainingspunkt und Herzfrequenz damit beginnen, Fett zu verbrennen. Bei den Zürcher Messungen setzte bei einigen Probanden die Fettverbrennung erst nach einerinhalb Stunden, bei anderen schon viel früher ein.

Die Wissenschaftler wollen nun ihre Messtechnik weiter verfeinern. Mit einem deutlich kleineren Chip könnte ein handliches Gerät für den Alltagsgebrauch entstehen. Trainiert können Sportler und Abnehmwillige individuell überprüfen, wann ihre Körper beginnen, Fett zu verbrennen, um so ihr Training zu optimieren", sagte Güntner.

Gerätfeit wird an ETH und Universitätsspital aber auch an weiteren Gassensoren, die andere Moleküle in der Atemluft registrieren. Interessant wären etwa Sensoren für Ammoniak, mit denen sich die Nierenfunktion überprüfen ließen, oder für Isopren, um den Cholesterinstoffwechsel zu untersuchen. (APA, 11.10.2017)

Originalpublikation:

Analytical Chemistry: "Noninvasive body fat burn monitoring from exhaled acetone with Si-doped WO3 sensing nanoparticles".

Mehr zum Thema:

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Fettabbau: Neue Einblicke in den Lipidstoffwechsel

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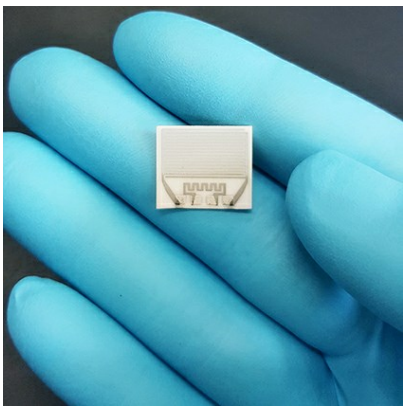
Mehr zum Thema "Abnehmen"

Tiny Breath Acetone Sensor to Measure Fat Burning During Exercise, Help Monitor Diabetes

OCTOBER 13TH, 2017 EDITORS SPORTS MEDICINE

Those wishing to lose weight have to watch their diet, but for optimal results they also have to burn existing fat in their bodies through exercise. Any amount of exercise simply won't do, as body fat only burns when pressed to do so by specific physiological situations. Therefore, it would be nice to know that one's exercise is actually achieving the fat burning goals.



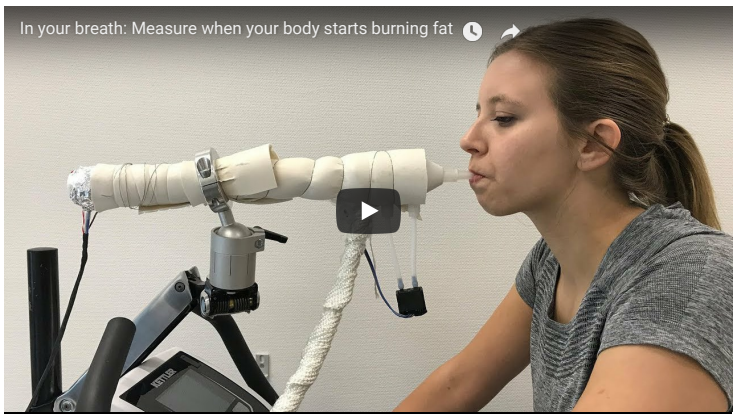
It's been known for a while that when we burn built-up fat, the acetone in our breath increases in concentration. Additionally, acetone is also a biomarker that tracks closely with one's blood glucose levels, making it potentially useful as a way to detect and monitor diabetes.

Measuring the level of acetone in one's breath is difficult, though, because of the high moisture amount and other breath components that comes along with it, confusing most sensors. Researchers at ETH Zurich in Switzerland have now developed a tiny, highly accurate acetone breath sensor that may soon serve as a core for fitness wearables and diabetes diagnostic devices.

The new sensor, about the size of a coin, is so selective that it detects acetone exclusive of all other chemicals found in our breath. Moreover, it detects individual molecules of acetone per 100 million parts of everything else, an impressive level of accuracy.

The technology was tested on volunteers riding a stationary bike equipped with the breath sensor. It worked so well that the scientists were able to show that, contrary to what was previously believed, some people begin burning fat soon after starting to exercise. Previously, it was thought that everyone has to get moving for quite a while before the body gets to power it with stored fat.

Here's an ETH Zurich video about the new sensor:



Flashbacks: Accurate Acetone Measurement in Breath for Quick Diabetes Diagnosis...; LEVL Measures Acetone in Breath to Detect Body Fat Burning...; New Acetone Breathalyzer May Replace Blood Glucose Testing for Managing Diabetes...; New Exhaled Breath Sensor to Spot Diseases, Monitor Health...; Portable Acetone Detector to Help Monitor Fat Burning During Exercise...; Breathalyzer Tech: Acetone Nanosensor Could Measure How Well You Manage Your Diabetes...; New Breath Sensor for Indirect Glucose Monitoring, Cancer Detection...

Study in journal *Analytical Chemistry*: Noninvasive Body Fat Burn Monitoring from Exhaled Acetone with Si-doped WO_3-sensing Nanoparticles...

Via: ETH Zurich...

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Zürcher ETH-Forscher messen Fettabbau über die Atemluft

ETH-Forscher haben einen Sensor entwickelt, der mit einer einfachen Analyse der Atemluft einer Person anzeigt, ob deren Körper Fett verbrennt oder nicht. Das Ziel ist ein Messgerät für den Alltagsgebrauch - für das Training oder während einer Diät.

Agentur sda
Dienstag, 10. Oktober 2017, 14:27 Uhr

Eine Studentin demonstriert das Gerät, das aufgrund der Atemluft den Fettabbau im Körper nachweist. (ETH Zürich, Simon Zogg)

Wann der Körper damit beginnt, Fett zu verbrennen, lässt sich heute unter anderem mit einer Blutanalyse bestimmen. Wissenschaftler der ETH Zürich und des Universitätsspitals Zürich stellen nun in den ETH-News eine Methode vor, mit der sich der Fettabbau «ganz einfach und in Echtzeit in der Atemluft» nachweisen lässt.

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Nachweis im Fitnessraum

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Verfeinern und weiterentwickeln

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Quelle: Südostschweiz

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10.10.2017 14:27

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(SDA)

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ΥΓΕΙΑ

Κάθε ανάσα «προδίδει» πόσο λίπος καίμε σε πραγματικό χρόνο (video)

Μέχρι τώρα η καύση του λίπους ήταν δυνατό να υπολογισθεί μέσω ενός τεστ αίματος ή ούρων, όπου μετρώνται συγκεκριμένοι βιοδείκτες που «προδίδουν» κατά πόσο έχει καεί το λίπος στο σώμα. Όμως τα τεστ αυτά είναι λιγότερο βολικά και πιο αργά σε σχέση με το νέο τεστ αναπνοής.

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Είναι γνωστό ότι αν κανείς θέλει να χάσει κιλά, θα πρέπει να τρώει λιγότερο και να γυμνάζεται περισσότερο. Αλλά πότε αρχίζει το σώμα να καίει το λίπος του, που είναι και το ζητούμενο, ώστε να μειωθεί έτσι το πάχος;

Ένας Έλληνας ερευνητής και οι συνεργάτες του στην Ελβετία ανέπτυξαν μια νέα μέθοδο που επιτρέπει την εύκολη και **σε πραγματικό χρόνο παρακολούθηση της λιπόλυσης** (καύσης του λίπους) μέσω ελέγχου της αναπνοής την ώρα της άσκησης. Έτσι, κάποιος μπορεί να γυμνάζεται και ταυτόχρονα να εκπνέει στη συσκευή, η οποία επί τόπου μετρά αν έχει αρχίσει να καίει λίπος και πόσο.

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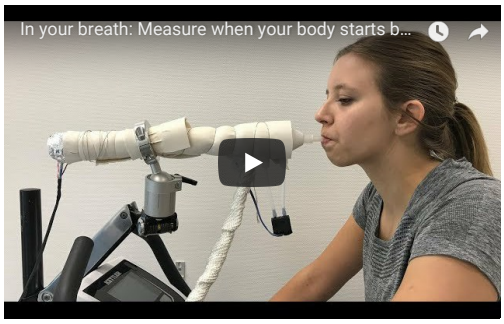

Οι ερευνητές, με επικεφαλής τον καθηγητή Σωτήρη Πρατσίνη του Ελβετικού Ομοσπονδιακού Ινστιτούτου Τεχνολογίας (ETH) της Ζυρίχης, έκαναν τη σχετική δημοσίευση στο περιοδικό αναλυτικής χημείας «Analytical Chemistry».

Όταν κάποιος καίει λίπος, το σώμα του παράγει υποπροϊόντα μεταβολισμού, που καταλήγουν στο αίμα. Στους πνεύμονες αυτά τα μόρια, ιδίως τα πτητικά, εισέρχονται στον αέρα που εκπνέει ο άνθρωπος. Το πιο πτητικό και εύκολα ανιχνεύσιμο από αυτά τα οργανικά μόρια είναι η ακετόνη.

Η νέα συσκευή διαθέτει αισθητήρες που μετρούν την παρουσία της ακετόνης στην εκπνοή με μεγαλύτερη ευαισθησία από κάθε προηγούμενο αισθητήρα, καθώς **μπορεί να ανιχνεύσει ένα μόνο μόριο ακετόνης ανάμεσα σε εκατοντάδες εκατομμύρια άλλα μόρια**.

Οι δοκιμές που έγιναν, αποκάλυψαν ότι το πόσο γρήγορα οι άνθρωποι αρχίζουν να καίνε λίπος, διαφέρει πολύ από άτομο σε άτομο - κάτι που έχει μεγάλη σημασία τόσο γι' αυτούς που γυμνάζονται για να αδυνατίσουν, όσο και για τους αθλητές.Έτσι, ενώ σε μερικούς ανθρώπους πρέπει να περάσει μιάμιση ώρα άσκησης εωσότου αρχίσει η λιπόλυση, σε άλλους αρχίζει πολύ πιο γρήγορα.

Ο υπερευαίσθητος αισθητήρας χρησιμοποιεί ένα «τσιπάκι», με μέγεθος όσο ένα κέρμα του λεπτού του ευρώ, που ο Σ.Πρατσίνης άρχισε να αναπτύσσει πριν από επτά χρόνια. Το τσιπ είναι καλυμμένο με ένα πορώδες φιλμ από **ειδικά αγώγιμα νανοσωματίδια**, αποτελούμενα από τριοξείδιο του βολφραμίου και άτομα πυριτίου. Τα νανοσωματίδια αυτά αλληλεπιδρούν με την ακετόνη και έτσι η τελευταία μπορεί να ανιχνευθεί στην εκπνοή, πράγμα που «προδίδει» την καύση του λίπους στο σώμα.

Ο Πρατσίνης και η ομάδα του ήδη εργάζονται **για να σμικρύνουν κι άλλο το τσιπάκι**, ώστε τελικά να κυκλοφορήσουν στο εμπόριο μια φορητή συσκευή για το τεστ αναπνοής, που θα μπορεί εύκολα να χρησιμοποιήσει κάθε αθλητής ή όποιος θέλει να χάσει κιλά με γυμναστική. Γνωρίζοντας σε πραγματικό χρόνο πότε αρχίζει να καίει λίπος, θα διαμορφώνει ανάλογα το πρόγραμμα της άσκησής του, κάνοντας είτε περισσότερη είτε λιγότερη.

Επίσης οι ερευνητές μελετούν την ανάπτυξη ανάλογων αισθητήρων και για άλλα μόρια, ώστε να υπάρξουν και άλλα τεστ αναπνοής (π.χ. αμμωνίας για τεστ λειτουργίας των νεφρών, ισοπρενίου για τεστ μεταβολισμού χοληστερίνης, αλδεϋδών για τεστ καρκίνου των πνευμόνων κ.α.).

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- **ΝΔ: Το μόνο που πέτυχε ο Τσίπρας είναι η πανάκριβη συμφωνία για τα F-16**
- **Φρένο από Βρυξέλλες στα σχέδια της κυβέρνησης να μοιράσει μέρισμα 1000 ευρώ**

περισσότερα »

Άρθρα για: ΥΓΕΙΑ

Αυξάνονται τα αιτήματα για παροχή σχολικού νοσηλευτή

Τη σχολική χρονιά 2015-16 προσελήφθησαν 144 σχολικοί νοσηλευτές και φέτος μέχρι στιγμής 479. Ένα μεγάλο μέρος των αιτημάτων αφορά παιδιά με...

- **Οι σωματικές επιπτώσεις της μοναξιάς**
- **Πολλά υποσχόμενη η επίδραση των ψυχεδελικών μανιταριών στους καταθλιπτικούς**

περισσότερα »

Δείτε | Ακούστε


Η συνέντευξη τύπου Τραμπ - Τσίπρα
17.10.2017, 21:08


Ο Έλληνας Πρωθυπουργός στον Λευκό Οίκο
17.10.2017, 20:48


Αλέξης Παπαχελάς 17/10/2017 (20:00)
17.10.2017, 20:47


ΕΛΣΤΑΤ: Ύφεση 0,2% για την οικονομία το 2016
17.10.2017, 20:46


Συνάντηση Τσίπρα - Λαγκάρντ στην Ουάσινγκτον
17.10.2017, 20:45


Πρόγνωση καιρού
17.10.2017, 20:45


Καλά Νέα
17.10.2017, 20:41


Τα νέα του ΣΚΑΪ 20:00
17.10.2017, 20:00


Στον Λευκό Οίκο ο Πρωθυπουργός
17.10.2017, 19:34


RODEO
17.10.2017, 18:45


My Style Rocks
17.10.2017, 16:15


Συνάντηση Τσίπρα - Λαγκάρντ
17.10.2017, 15:08


ΕΔΩ
17.10.2017, 14:50


Τα νέα του ΣΚΑΪ 14:00
17.10.2017, 14:00


Πολιτική συζήτηση στους Αταίριαστους
17.10.2017, 13:47


Εισβολή κουκουλοφόρων στον συμβολαιογραφικό σύλλογο Αθηνών
17.10.2017, 13:38

Ο Σωτήρης Πρατσίνης γεννήθηκε στα Χανιά το 1955, σπούδασε στο Τμήμα Χημικών Μηχανικών του Αριστοτελείου Πανεπιστημίου Θεσσαλονίκης και πήρε το διδακτορικό του από το Πανεπιστήμιο της Καλιφόρνια στο Λος 'Αντζελες (UCLA) το 1985. Διετέλεσε καθηγητής στη Σχολή Χημικών Μηχανικών του Πανεπιστημίου του Σινσινάτι των ΗΠΑ και από το 1998 είναι καθηγητής στο Τμήμα Μηχανολόγων και Χημικών Μηχανικών του ΕΤΗ, όπου ίδρυσε το Εργαστήριο Τεχνολογίας Σωματιδίων.

Tags: λίπος, καύση

Πρόσφατα | **Δημοφιλή** | **Emailed**

Κάθε ανάσα «προδίδει» πόσο λίπος καίμε σε πραγματικό χρόνο (video)
Μέχρι τώρα η καύση του λίπους ήταν δυνατό να υπολογισθεί μέσω ενός τεστ αίματος ή ούρων, όπου μετρώνται...
17.10.2017, 09:58

Αυξάνονται τα αιτήματα για παροχή σχολικού νοσηλευτή
Τη σχολική χρονιά 2015-16 προσελήφθησαν 144 σχολικοί νοσηλευτές και φέτος μέχρι στιγμής 479. Ένα μεγάλο...
16.10.2017, 14:48

Οι σωματικές επιπτώσεις της μοναξιάς
Μια στις τόσες κάθε άνθρωπος αισθάνεται μοναξιά. Όταν όμως το πρόβλημα γίνεται χρόνιο, τότε ενδέχεται να...
16.10.2017, 11:49

Πολλά υποσχόμενη η επίδραση των ψυχεδελικών μανιταριών στους καταθλιπτικούς
Η αντικαταθλιπτική δράση της ψιλοκυβίνης φάνηκε να διαρκεί έως πέντε εβδομάδες μετά από τη χορήγησή της.
14.10.2017, 09:59

Παγκόσμια Ημέρα Αυγού: Η υπερτροφή που μας κάνει καλό για πάντα
Το αυγό είναι πλούσιο σε υψηλής ποιότητας πρωτεΐνη, βιταμίνες και μέταλλα και συμβάλλει στη σωστή ανάπτυξη...
13.10.2017, 13:58

Ολοένα και πιο παχύσαρκος ο πληθυσμός των ΗΠΑ
Οι ειδικοί ανησυχούν για την παχυσαρκία καθώς συνδέεται με πιθανόν θανατηφόρες ασθένειες, όπως ο διαβήτης...
13.10.2017, 09:25

Αυξάνονται διαρκώς τα κρούσματα ιλαράς
Σύμφωνα με τα στοιχεία του Κέντρου Ελέγχου και Πρόληψης Νοσημάτων, έχουν καταγραφεί 250 κρούσματα ιλαράς, με...
12.10.2017, 17:38

ΗΠΑ: Το πρώτο καρδιοχειρουργικό εμφύτευμα που μεγαλώνει μαζί με το παιδί
Γιατροί και μηχανικοί στις ΗΠΑ ανέπτυξαν ένα πρωτοποριακό χειρουργικό εμφύτευμα που μεγαλώνει και αυτό σε...
12.10.2017, 09:14

Ελαφρώς μικρότερη η θνησιμότητα αυτών που χειρουργήθηκαν από γυναίκα
Ανάμεσα στις πιθανές αιτίες που συμβαίνει αυτό, είναι ότι οι γυναίκες ακολουθούν πιο πιστά τους κανονισμούς...
11.10.2017, 09:37

Παγκόσμια ημέρα παχυσαρκίας - Πρωταθλήτρια η Ελλάδα σε παχύσαρκα αγόρια
Η Ελλάδα έχει τη μεγαλύτερη αναλογία παχύσαρκων αγοριών στην Ευρώπη (16,7% του πληθυσμού), ενώ η Μάλτα τα...
11.10.2017, 09:30

1 | 2 | 3 | 4 | 5 | 6 | 7 | ... | 16 Επόμενη

Σχόλια Αναγνωστών

Αποστολή Παραπόνων

Παρακαλούμε να είστε ευγενικοί και να σέβεστε τους συνομιλητές σας. Αποφύγετε τις ύβρεις και τους χαρακτηρισμούς. Προστατέψτε τα προσωπικά σας δεδομένα. Αν κρίνετε ότι το περιεχόμενο της ιστοσελίδας είναι παράνομο ή προσβάλει οποιοδήποτε δικαίωμα σας, παρακαλούμε επικοινωνήστε μαζί μας. Θα απαντήσουμε στο αίτημα σας το συντομότερο δυνατόν.

πανάκριβη συμφωνία για τα F-16

21:16, ΟΙΚΟΝΟΜΙΑ

Φρένο από Βρυξέλλες στα σχέδια της κυβέρνησης να μοιράσει μέρισμα 1000 ευρώ

22:15, ΟΙΚΟΝΟΜΙΑ

Διαβεβαιώσεις Τσίπρα για το Ελληνικό μπροστά στον Τραμπ

- ΚΟΣΜΟΣ
- ΕΛΛΑΔΑ
- ΟΙΚΟΝΟΜΙΑ
- ΠΟΛΙΤΙΚΗ
- ΤΕΧΝΟΛΟΓΙΑ
- ΥΓΕΙΑ
- ΠΕΡΙΒΑΛΛΟΝ
- ΖΩΗ
- ΠΟΛΙΤΙΣΜΟΣ
- ΠΑΡΑΞΕΝΑ
- ΑΘΛΗΤΙΚΑ
- ΑΥΤΟ

23:59, Σειρές

Criminal Minds (Full HD)

Οι αρχές ανακαλύπτουν τα πτώματα δύο ανθρώπων στα διαμερίσματά τους στο Seattle, και ανακαλύπτουν ότι και τα δύο θύματα είχαν πρόσφατα παρακολουθήσει ένα σεμινάριο αυτοβοήθειας. Η ομάδα BAU θεωρεί αρχ…

- ΣΚΑΪ TV
- Πρόγραμμα
- Εκδηλώσεις
- Δελτία
- Νέες Εκπομπές
- Δίκτυο Τηλεόρασης
- The Voice of Greece

06:00

Άσε μας πρωί-πρωί

Είναι αταίριαστοι... ωστόσο -κατά ένα περίεργο τρόπο- ταιριάζουν!

- ΣΚΑΪ 100,3
- Πρόγραμμα
- Εκδηλώσεις
- Δελτία
- Δίκτυο 100,3

Podcast

1η Ενότητα: Γνωρίζοντας την Ιστορία μας – Ακρόπολη

ΟΡΟΙ ΧΡΗΣΗΣ ΠΡΟΣΤΑΣΙΑ ΠΡΟΣΩΠΙΚΩΝ ΔΕΔΟΜΕΝΩΝ ΑΝΑΦΟΡΑ ΠΡΟΒΛΗΜΑΤΟΣ